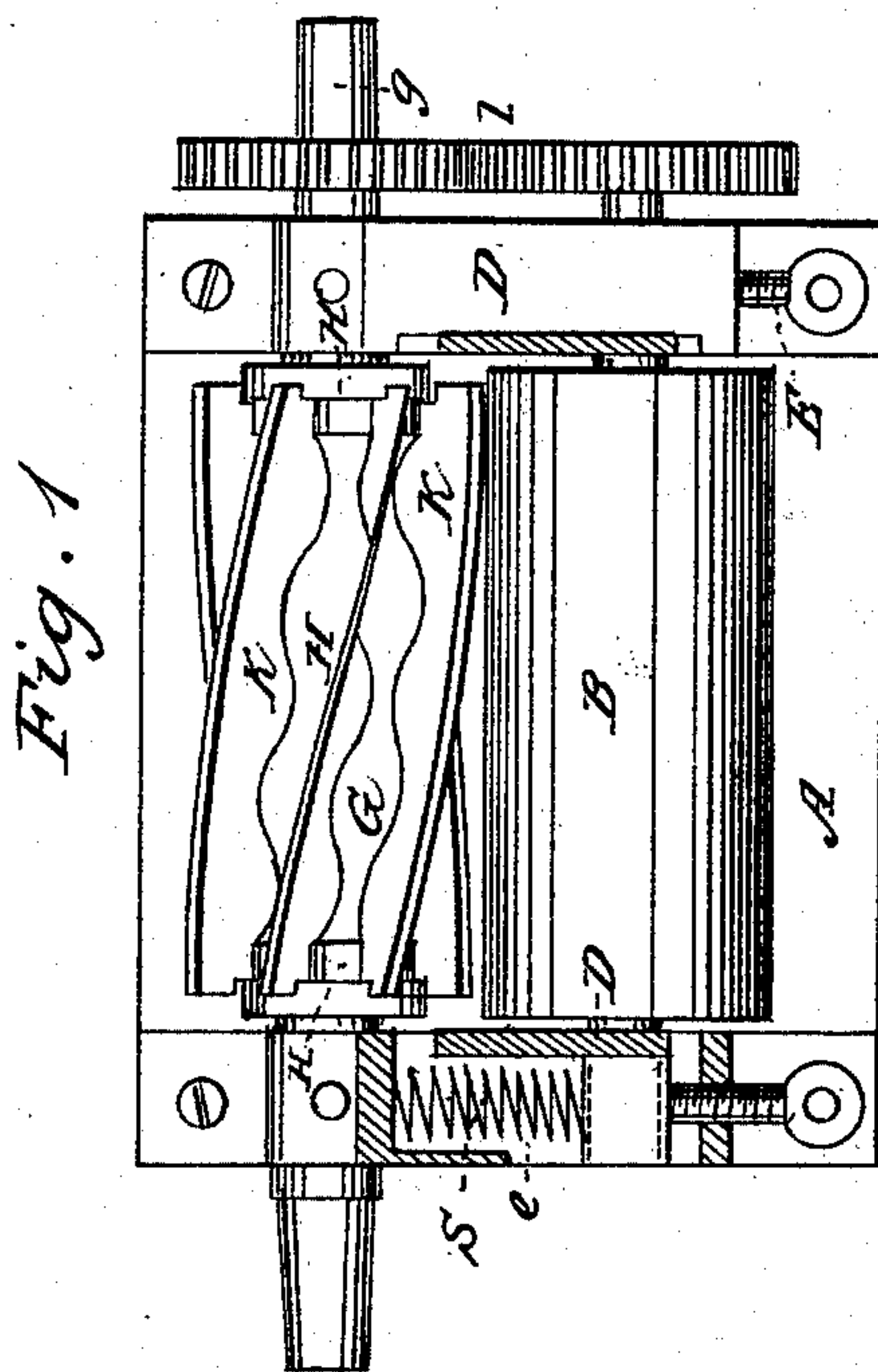
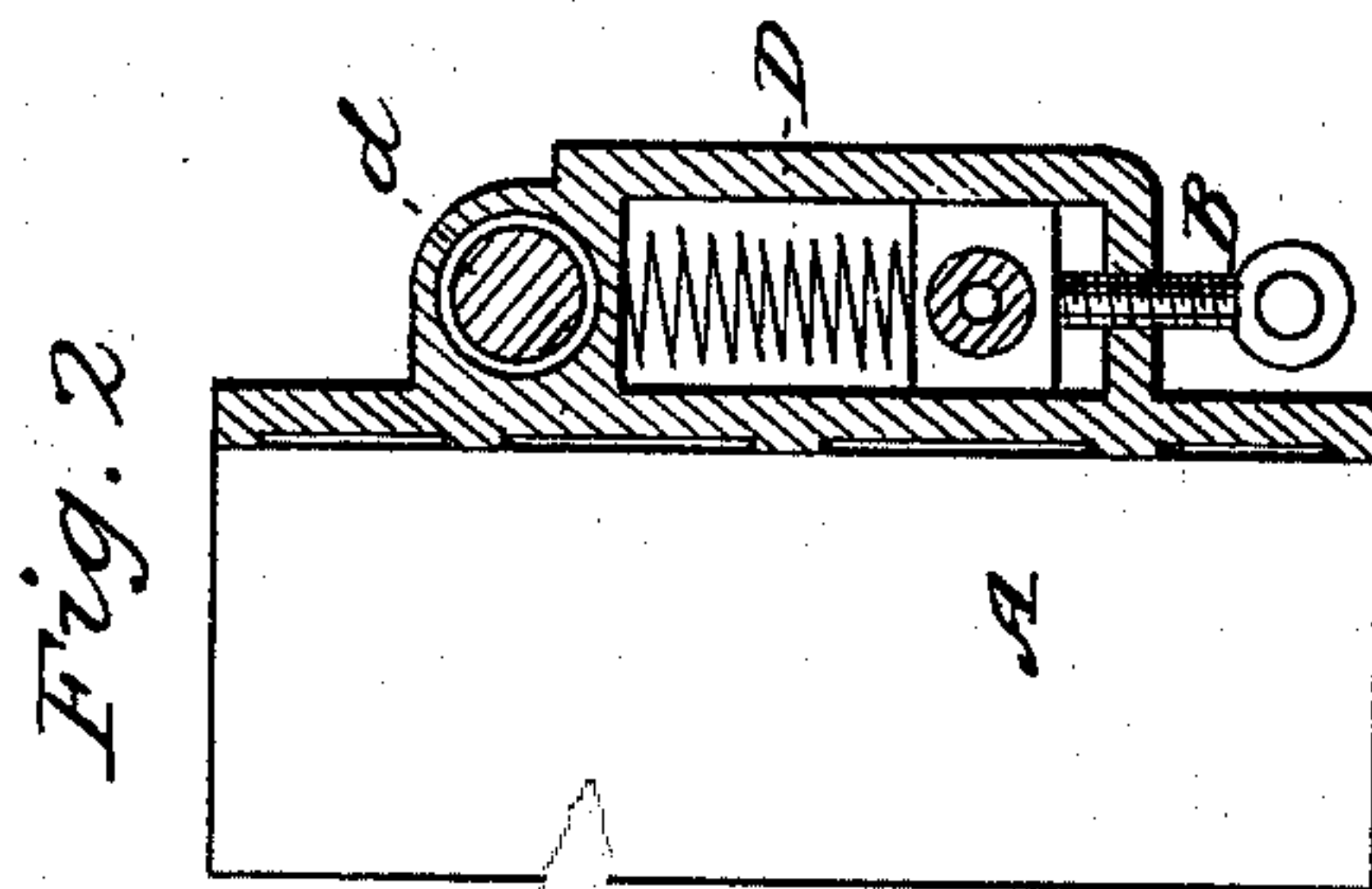
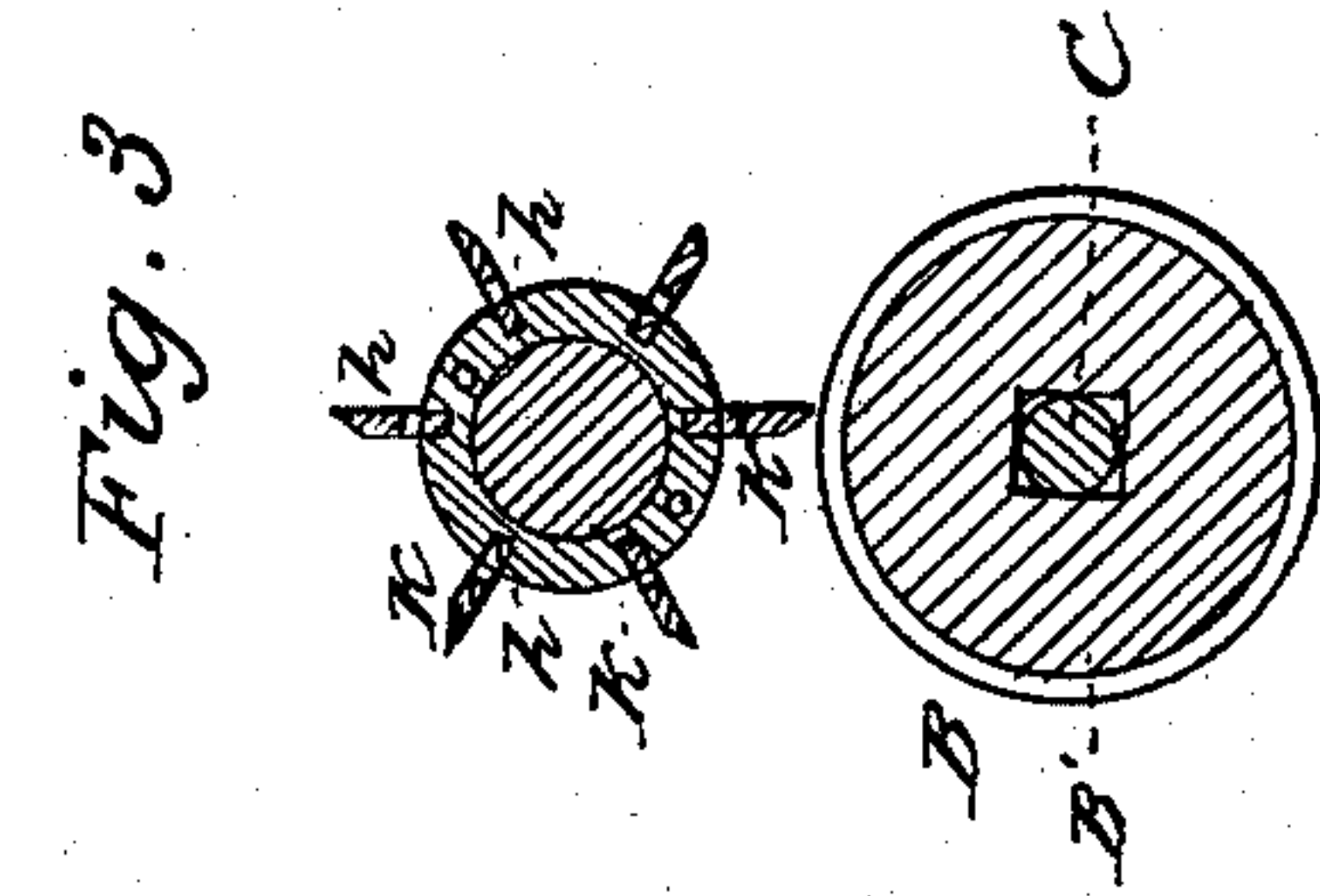
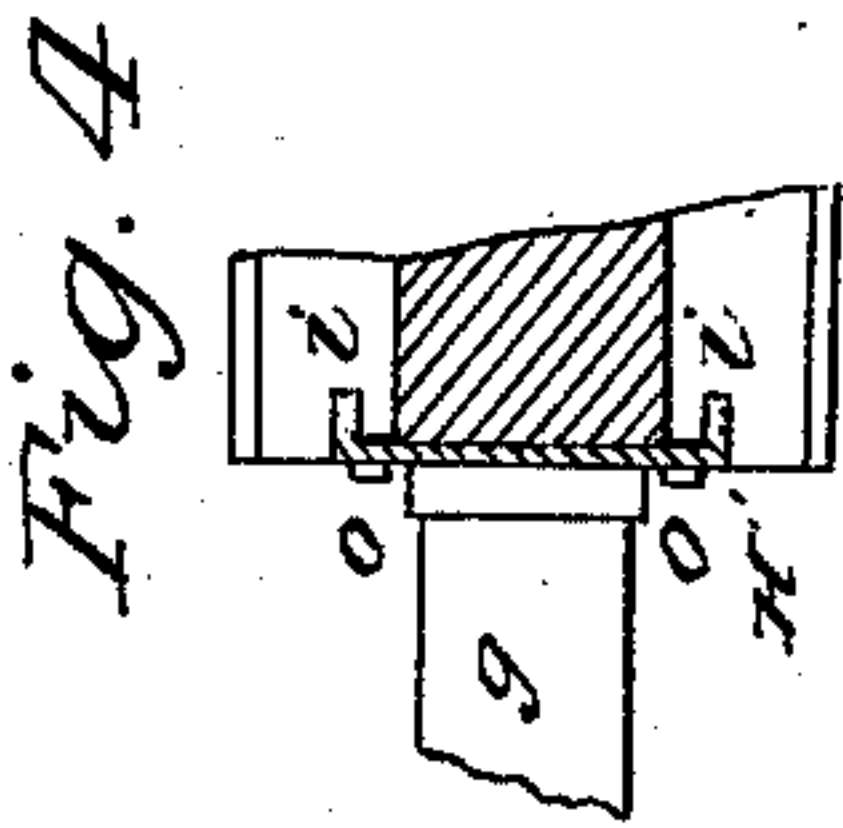


W. GALE.  
Straw Cutter.

No. 61,933.

Patented Feb. 12, 1867.



Witnesses:

A. A. Ketchum  
J. O. Clayton

Inventor:

Warren Gale,  
by  
J. O. Clayton



# United States Patent Office.

WARREN GALE, OF CHICOPEE FALLS, MASSACHUSETTS.

*Letters Patent No. 61,933, dated February 12, 1867; antedated August 12, 1866.*

## IMPROVEMENT IN STRAW-CUTTERS.

*The Schedule referred to in these Letters Patent and making part of the same.*

### TO ALL WHOM IT MAY CONCERN:

Be it known that J. WARREN GALE, of Chicopee Falls, in the county of Hampden, and in the State of Massachusetts, have invented a certain new and useful Machine for Cutting Hay, Straw, Rags, and other substances; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, forming a part of this specification.

To enable others skilled in the art to make and use my invention, I will describe its construction and operation. In the drawings similar characters refer to like parts; and

Figure 1 is an end view of my invention attached to the mouth of a common wooden "cutting-box.

Figure 2 is a cross-section through the adjustable journal-boxes of the same.

Figure 3 is a cross-section through the knife and pressure-cylinders.

Figure 4 is a detail section showing the mode of securing the knives to the knife-cylinder.

In the drawings, A represents the cutter-box, which is made in the usual form of a trough narrowing towards the mouth. B is the pressure-cylinder, its inner portion, B', being made of wood or iron, and its outer surface being made of zinc or copper, or some other metal or metallic composition softer than iron and harder than lead. C the shaft of cylinder B, and turns in the sliding-boxes c, which slide in the journal-brackets D. D are the heavy cast-iron journal-brackets, fixed by screws to the cutter-box, and are provided with boxes, d, for the shaft of the knife-cylinder, and with a recess, e, for the sliding-boxes c. S are heavy spiral springs within the recesses e, and force the sliding-boxes up against the regulating screws E. G is the knife-cylinder, made of cast iron, with a wrought-iron shaft, g. K are the spiral steel knives, placed in spiral grooves, h, extending the whole length of the cylinder G. H are collars on each end of the cylinder G, locking into notches, i, in the knives, so as to confine the knives in their places. The collars are fixed to the cylinder by screws, o. I are two cog-wheels of the same size and number of teeth, fast to the shafts of the two cylinders B and G, which are thus geared so that they may revolve with the same speed. The diameter of the pressure-cylinder, and of the circle enclosing the outer edges of the knives, is the same, so that a given knife shall always strike the same curve of contact on the pressure-cylinder. By turning up the regulating screws E, the cog-wheels can be disengaged and turned so that different teeth shall come in contact; the screws can then be turned down, and it will be found the same knife will strike another curve of contact, parallel with and a short space from the first curve.

My improvement relates to that class of straw-cutters constructed with a shaft or cylinder of knives cutting against an opposite roller, usually made of raw-hide. The nature of my invention consists in using old and well-known parts of such machines in new combination, making a new machine more practically useful and efficient. I make the roller used to cut against, and which I have called the pressure-cylinder B, of wood or other material, and surround its whole periphery with zinc, copper, or tin, or other suitable soft metal, for the knives on the opposite cylinder to cut against. I usually construct the pressure-cylinder by casting a cylinder B (fig. 3) of zinc, and fixing it on a wooden roller B', and for the ordinary purpose of cutting hay this is the best way. The zinc should be about one-fourth or three-eighths of an inch thick; it can be cast in two or more pieces or shorter cylinders, and be fastened, by screws or otherwise, to the wooden roller; or the inner portion, B', may be of iron cast hollow, and having a wrought-iron shaft, C. When wood is used, the roller may be turned out of a single piece, or it may be made of a number of disks about an inch thick, placed on the shaft, with the grain of one disk at right angles with its adjoining disks. When the roller is constructed in disks there is less liability to splitting or shrinking, so that the metal will become loose. When great durability is considered more important than first cost, and where the highest perfection of operation is desired, as for cutting rags or paper, copper about three-sixteenths of an inch thick should be used to cover the roller. The knife-cylinder G is provided with spiral knives, K, or with straight knives placed obliquely on the cylinder so that only a very short part of the edge shall at a time come in contact with the pressure-cylinder. When more than four knives are used, the best way is to fasten them in grooves h, (fig. 3,) in the cylinder G by means of the collars H, (fig. 4,) but when only four or a less number of knives are used, a better way will be to secure them to flanges cast on the cylinder, as is commonly practised. The amount of spiral twist for the knives may be varied, but that shown in the drawing is believed to be the best. It is essential to the successful operation of the machine that the pressure-cylinder B, and the knife-cylinder G, should be geared together in such a way as to bring the edge of the knife into contact with the soft metal, and that at the point of contact the soft metal and edge of the



knife shall move at equal speed. If constructed otherwise, the soft metal is more liable to be scraped and worn out. Besides, unless the metal is too soft, like lead, too soft to be useful for this purpose, the edge of the knife will be immediately torn off. This objection constitutes the chief reason why the use of soft metal rollers has not heretofore answered even tolerably well. The adjustable bearings allow the meshing of the gears to be changed so as to adjust the knives to a different curve of contact with the cylinder, so that by a series of different adjustments the whole of the pressure-cylinder may be cut over, until the soft metal is worn out. I am aware that rollers have been heretofore made with a surface of soft metal to cut against, but such rollers have been so combined and operated as to be almost, if not wholly, useless. Experience shows that a knife placed parallel on the cylinder, so that the whole length of it strikes on the soft metal at once, makes so inferior a machine that scarcely any are now in use, although the invention is old. By the use of the spiral or oblique knife, geared to a roller of soft metal, so that the knives and cylinder shall move at the same speed, all combined in one machine, I produce a very valuable cutter of the class to which it relates, and am enabled for the first time to make a successful practical use of the soft metal roller constructed as described.

Having thus fully described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The pressure-cylinder B, constructed as described, and having its entire periphery covered with a surface of soft metal, in combination with a knife-cylinder provided with oblique or spiral knives, when the said cylinders are constructed and operated so that the edge of a knife, at the point of contact with the soft metal, shall move at the same speed as the pressure-cylinder, substantially as and for the purposes specified.
2. The sliding-boxes c, springs S, and screws E, in combination with the devices claimed in the first claim.
3. The spiral knives K, when secured in spiral grooves h, in the cylinder G, when the said cylinder is geared to the pressure-cylinder B, all constructed and arranged substantially as above described.

In testimony that I claim the above-described invention, I have hereunto signed my name this 6th day of June, 1866.

WARREN GALE.

Witnesses:

HENRY E. PHIPPS,  
GEO. S. TAYLOR.